

Bañados-Silk-West effect with nongeodesic particles: Nonextremal horizons

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Abstract

© 2014 American Physical Society. If two particles collide near a black hole, the energy in their center of mass can, under certain conditions, grow unbounded. This is Bañados-Silk-West effect. We show that this effect retains its validity even if some force acts on a particle, provided some reasonable and weak restrictions are imposed on this force. In the present paper we discuss the case of nonextremal horizons. The result under discussion is similar to that for extremal horizons considered in our previous paper. The problem can be viewed both in its own right and as a simple setup in which this force models in the first approximation the complicated gravitational self-force.

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